SBeach Post-Processing / Damage Elements

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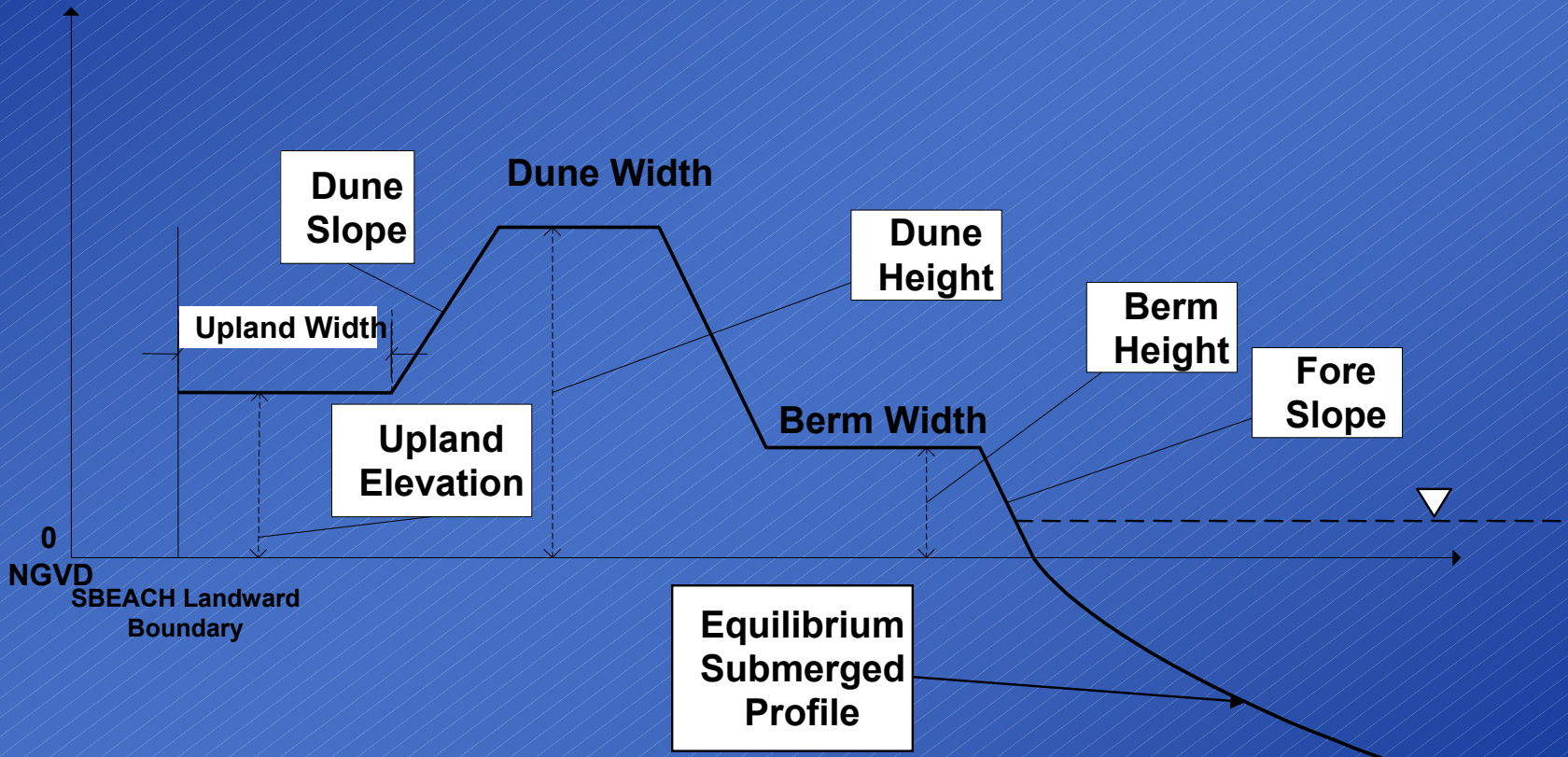
Overview

- Storm Response
  - SBeach .DAT Files
  - Processing Files
- Lots And Damage Elements
- Issues/Concerns

Beach Profile



Simplified Profile Runs

- SBeach runs provided by Mark Gravens
- Received data file (.DAT) containing information about a profile (simplified) with
  - Constant Dune Elevation
  - Constant Dune Width
  - Variable Berm Width (upper limit to 0, ex. 100 to 0)
- In order to account for changes in dune dimensions, and storm type, multiple data files are generated.
  - Naming conventions are used to specify profile in each data file.

SBeach Files

- Profiles Use The Following Naming Convention
  - ABR1_17.4_12_5
    - Dune Elevation = 17.4 ft
    - Dune Width = 12 ft
    - Berm Width = 5 ft

SBeach Data for Profile 1 (const Dune Elevation)

File Name	Dune Elev.	Dune Width	Berm Width	File Size
BBab1_13_12-ExtraTrop.dat	13	12	100 – 0 (10)	196 Mb
BBab1_13_12-Trops.dat	13	12	100 – 0 (10)	320 Mb
BBab1_13_8-ExtraTrop.dat	13	8	100 – 0 (10)	197 Mb
BBab1_13_8-Trops.dat	13	8	100 – 0 (10)	322 Mb
BBab1_13_4-ExtraTrop.dat	13	4	100 – 0 (10)	195 Mb
BBab1_13_4-Trops.dat	13	4	100 – 0 (10)	320 Mb
BBab1_13_0-ExtraTrop.dat	13	0	100 – 0 (10)	197 Mb
BBab1_13_0-Trops.dat	13	0	100 – 0 (10)	322 Mb

SBeach Data for Profile 1 (Variable Dune Elevation)

File Name	Dune Elev.	Dune Width	Berm Width	Num Files
BBab1_14.5_##-ExtraTrop.dat	14.5	12, 8, 4, 0	100 – 0 (10)	4
BBab1_14.5_##-Trops.dat	14.5	12, 8, 4, 0	100 – 0 (10)	4
BBab1_13_##-ExtraTrop.dat	13	12, 8, 4, 0	100 – 0 (10)	4
BBab1_13_##-Trops.dat	13	12, 8, 4, 0	100 – 0 (10)	4
BBab1_12_##-ExtraTrop.dat	12	12, 8, 4, 0	100 – 0 (10)	4
BBab1_12_##-Trops.dat	12	12, 8, 4, 0	100 – 0 (10)	4
BBab1_11.5_##-ExtraTrop.dat	11.5	12, 8, 4, 0	100 – 0 (10)	4
BBab1_11.5_##-Trops.dat	11.5	12, 8, 4, 0	100 – 0 (10)	4

SBeach Data

- Data files contain Storm Impacts on Profile
  - Data Representing The Effects Of a Particular Storm On a Particular Profile
    - Storm type is characterized by certain attributes
      - → Surge
      - → Duration
      - → Avg. Wave Height
      - → Storm Type (Tropical, Extra Tropical)

.DAT File Format

- Each Data File (.DAT) Contains a series of 6 Profiles
  - Given In Terms Of Cross-Shore Distance v/s Elevation Per Storm Profile Combination
    - Initial Ground Elevation

      →(x,z) Coordinates of original profile at time=0
    - Final Ground Elevation

      →(x,z) Coordinates of final profile at end of simulation

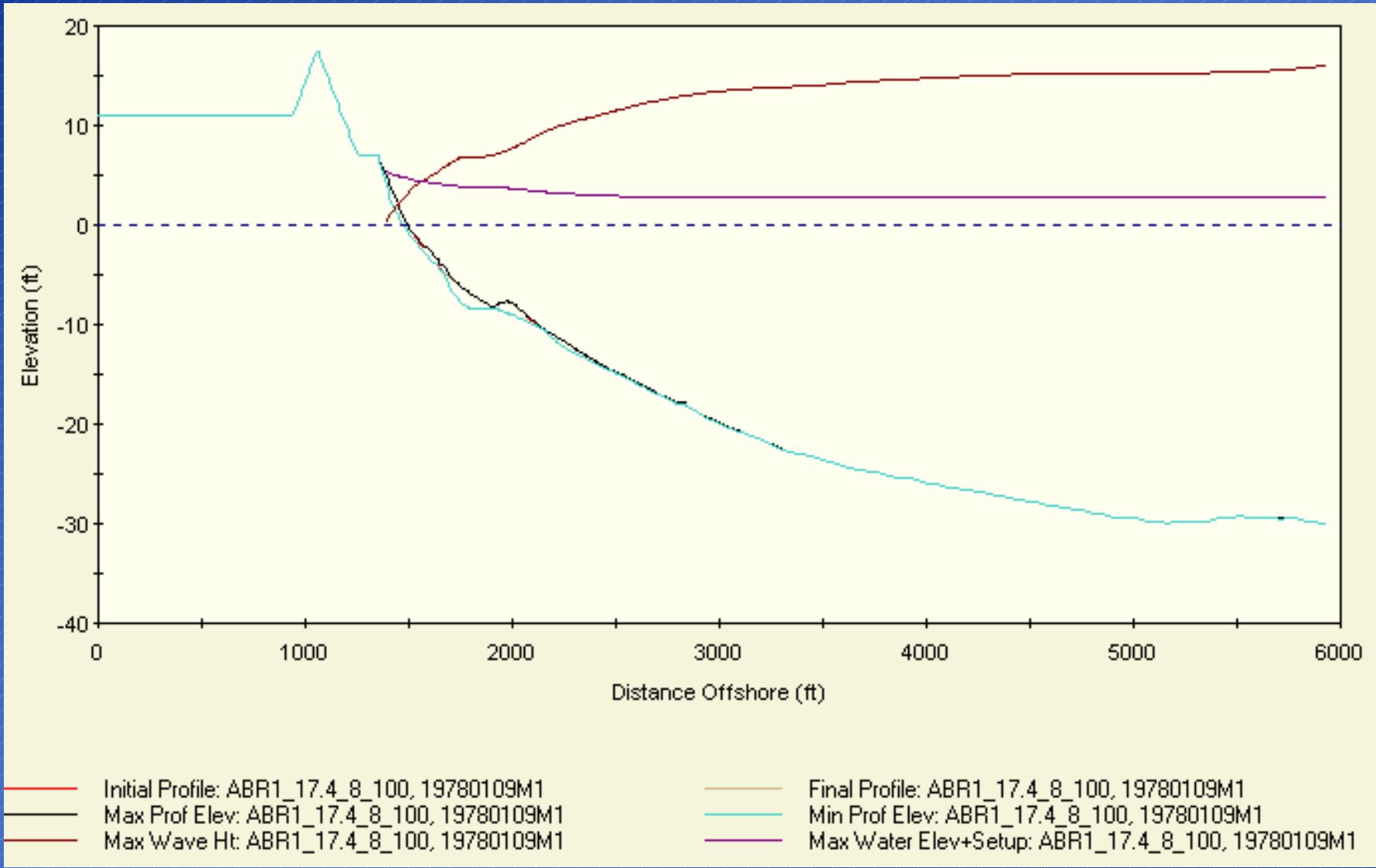
.DAT File Format (continued)

- Maximum Profile Elevation
  - (x,z) Coordinates of the maximum elevation of the profile, can occur anytime during the simulation
- Minimum Profile Elevation
  - (x,z) Coordinates of the minimum elevation of the profile, can occur anytime during the simulation
- Maximum Water Height
  - (x,z) Coordinates of max water height that occurred during the simulation
- Maximum Water Elevation + Setup
  - (x,z) Coordinates of max water height plus peak surge + tide that occurred during the simulation

.Dat File Example

```
Initial Profile: ABR1_17.4_8_100, 19780109M1
453
     0.0000      11.1000
     8.0000      11.0991
    16.0000      11.0983
    24.0000      11.0974
    32.0000      11.0966
    40.0000      11.0957
    48.0000      11.0949
    56.0000      11.0940
    64.0000      11.0932
    72.0000      11.0923
    80.0000      11.0915
    88.0000      11.0906
    96.0000      11.0898
   104.0000      11.0889
   112.0000      11.0881
   120.0000      11.0872
   128.0000      11.0864
   136.0000      11.0855
   144.0000      11.0847
   152.0000      11.0838
   160.0000      11.0830
   168.0000      11.0821
   176.0000      11.0813
   184.0000      11.0804
```

Graphical Representation



.DAT File Processing

- Method For Processing Data From SBeach Files
  - Approximately 20 Gigabytes Of DAT Files Generated for 2 profiles used in the Bogue Banks project
  - From DAT Files, the following information is extracted and inserted into the Storm Response Database:
    - Erosion Profile
    - Flooding Profile
    - Post Storm Dune Width Change
    - Post Storm Dune Elevation Change
    - Post Storm Berm Width Change

Thinned Profile

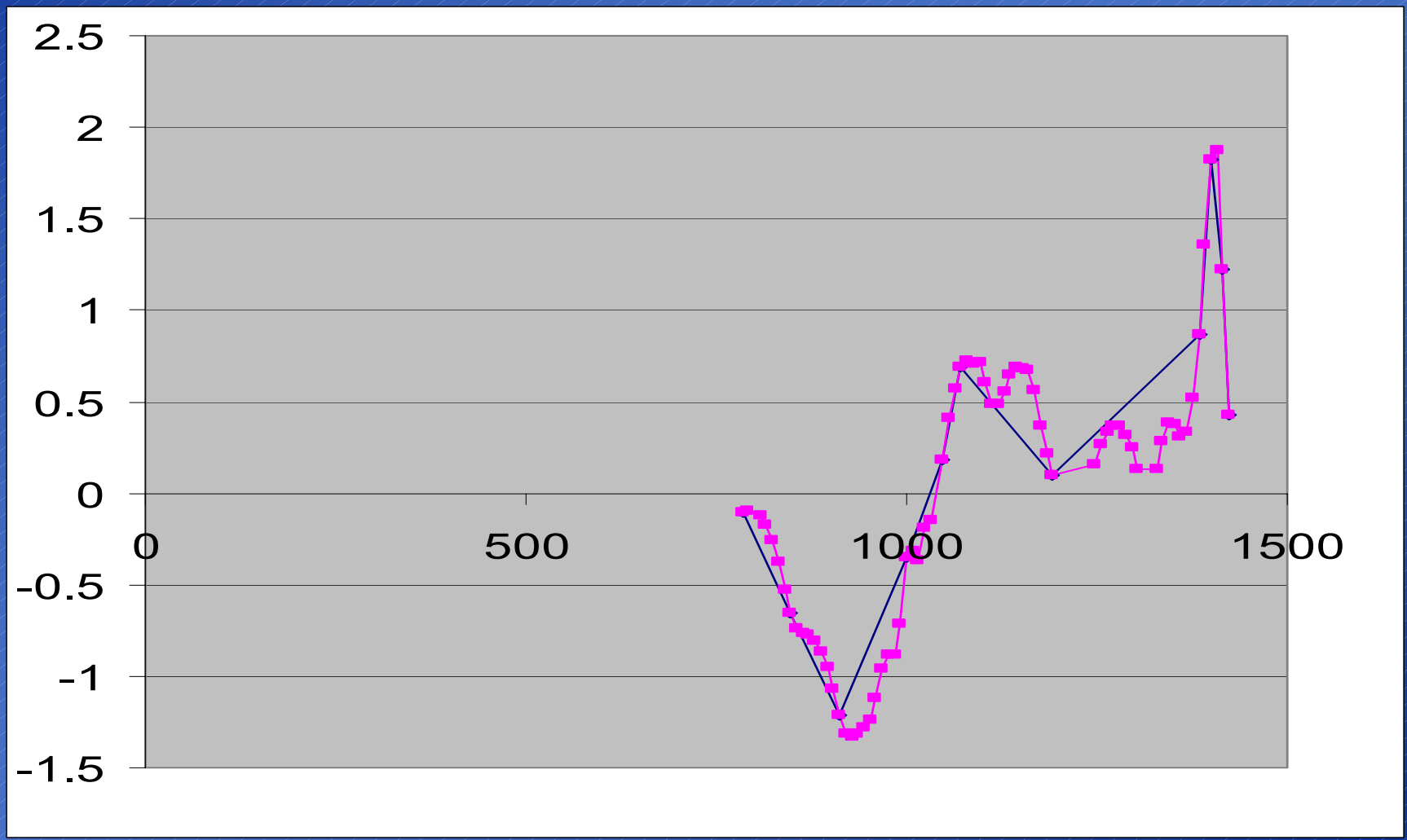
- Thinned Profile only contains values that differ by a given tolerance

```
Full Erosion Profile:
0 -0.128699999999999 1192.0000
1 -0.2996 1200.0000
2 -0.4326 1208.0000
3 -0.6219 1216.0000
4 -0.9583 1224.0000
5 -1.2114 1232.0000
6 -1.4085 1240.0000
7 -1.4977 1248.0000
8 -1.523 1256.0000
9 -1.4914 1264.0000
10 -1.4298 1272.0000
11 -1.3362 1280.0000
12 -1.2385 1288.0000
13 -1.1317 1296.0000
14 -1.0183 1304.0000
15 -0.8964 1312.0000
16 -0.765 1320.0000
17 -0.6316 1328.0000
18 -0.6165 1336.0000
19 -0.6332 1344.0000
20 -0.618 1352.0000
```

```
Thinned Results of Erosion Profile
0 -0.128699999999999 1192.0000
1 -0.9583 1224.0000
2 -1.4977 1248.0000
3 -0.8964 1312.0000
4 -0.261 1488.0000
5 -0.8575 1784.0000
6 -0.307 1928.0000
```

Given example has a tolerance of .50

Thinned Profile



Erosion Profile

- Minimum Profile – Initial Profile
- Profile Then Thinned By .25 ft
  - Only Values Up To The Shoreline Are Stored
    - Current system is not concerned with offshore erosion

Flooding Profile

- Maximum Water Elevation + Setup + (Max Wave Height / 2)
- Profile Then Thinned By .25 ft
- Only Values Up To The Shoreline Are Stored
  - Current system is not concerned with offshore flooding

Dune Change

- Post Storm Dune Elevation Change
  - Max(Initial Profile) – Max(Final Profile)
- Post Storm Dune Width Change
  - Pre and Post Storm Dune Width Distance Is Found Using The Dune Width Elevation Of 10.5 ft, per Mark Gravens
  - The Difference Is Then Calculated Using These Two Values

Post Storm Berm Width Change

- Pre and Post Storm Berm Width Distance Is Found Using The Berm Width Elevation Of 6.5 ft, per Mark Gravens
  - The Difference Is Then Calculated Using These Two Values

Magnitude of Processed Data

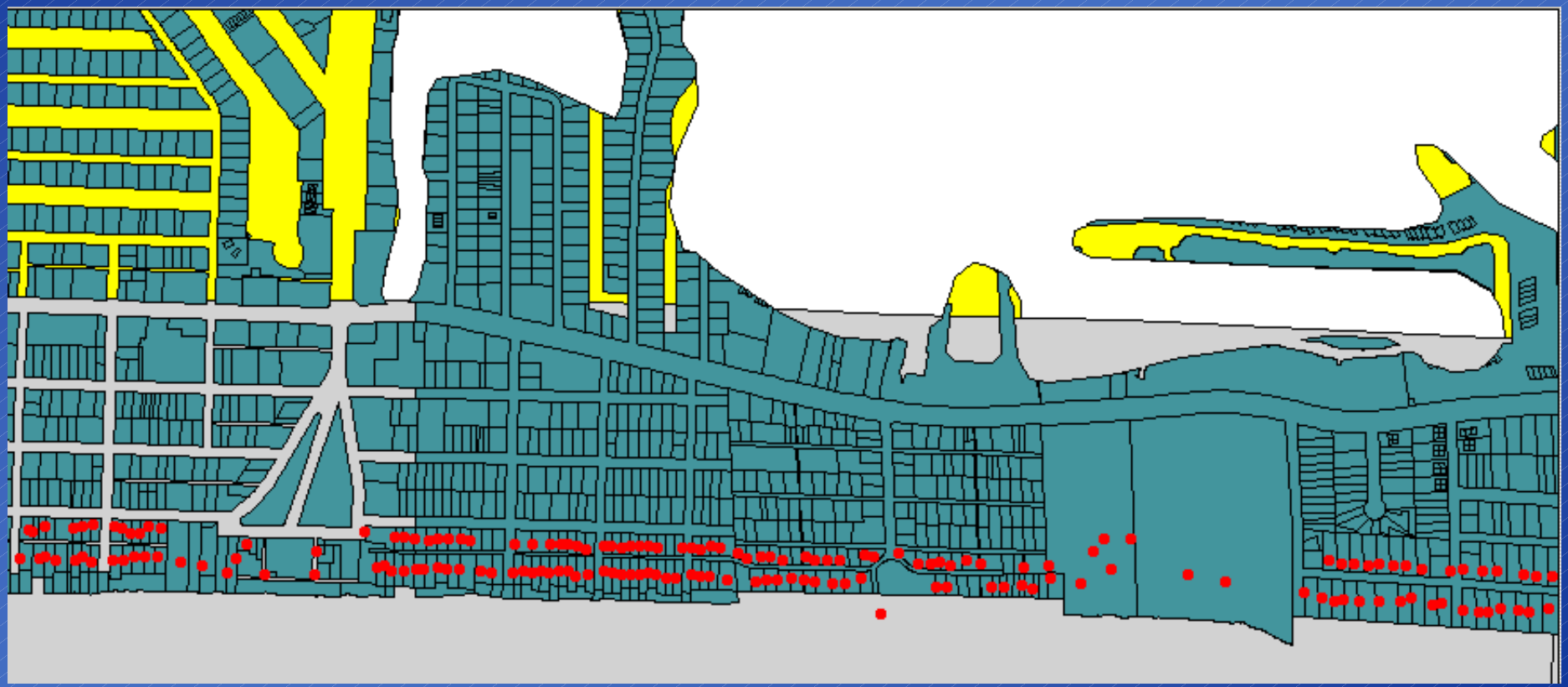
- Storm Response Database grows 280 MB in size

Data Type	Records Imported
Aggregated Storm impacts for 2 profiles	352,560
Detailed Information stored as Coordinate System Points	4,840,890

Lots And Damage Elements

- No central data source for both data sets
- Lot Data was retrieved from GIS informatoin
  - Parcels Shapefile (Wilmington District)
- Damage Element data was retrieved Excel Spreadsheet (Structure_October2002_V2.xls)
  - Bogue Banks project data (Wilmington District)
- Cleanup was required to synchronize the 2 data sets

AB-R2



Processing Data

- Methods We Used To Get The Data Into The Database
  - Lots (Parcel Shapefile) (Dick Males)
    - Third party tool was utilized to extract the Bounding Rectangles For Each Lot from the Parcel Shapefile
    - Extracted information was saved to a file, then Manually Imported Into the Lot Inventory within the database.

Damage Elements

- Structure_October2002_V2.xls

Ocean_N	Ocean_E	Land_N	Land_E	Grd_El	1st FLOOR ELEVATION	DISTANCE FF TO GRD	Estimated Distance	Grd_N	Grd_ID	Grd_E		ID	Reach
351911	2690976	352034	2690865	14.2	24.2	10.0		352020	1AB	2690915		1AB	8
352105	2690948	352242	2690867	16.6	26.6	10.0		352140	2AB	2690891		2AB	8
352169	2690826	352330	2690766	16.3	26.3	10.0		352232	3AB	2690764		3AB	8
352045	2690630	352101	2690767	14.3	24.3	10.0		352121	4AB	2690713		4AB	8
352080	2690499	352109	2690644	15.7	25.7	10.0		352150	5AB	2690525		5AB	8
352208	2690617	352305	2690658	13.2	23.2	10.0		352250	6AB	2690676		6AB	8
352082	2690442	352198	2690363	15.8	18.8	3.0		352195	7AB	2690343		7AB	8
352213	2690421	352338	2690391	14.3	20.3	6.0		352233	8AB	2690365		8AB	8
352275	2690073	352403	2690049	7.4	13.4	6.0		352303	9AB	2690154		9AB	9
352110	2690089	352242	2690057	8.7	17.7	9.0		352172	10AB	2690143		10AB	9
352101	2690285	352164	2690333	14.2	14.2	0.0		352164	11AB	2690333		11AB	8
352226	2689744	352285	2689870	10.8	10.8	0.0		352223	12AB	2689733		12AB	9
352280	2689747	352397	2689852	9.8	15.8	6.0		352342	13AB	2689743		13AB	9
352275	2689464	352356	2689558	12.4	17.4	5.0		352271	14AB	2689442		14AB	9
352352	2689482	352452	2689551	10.5	16.5	6.0		352428	15AB	2689457		15AB	9
352330	2689645	352450	2689694	8.4	8.4	0.0		352375	16AB	2689615		16AB	9
352399	2689141	352453	2689224	10.0	16.0	6.0		352402	17AB	2689253		17AB	10
352392	2688882	352446	2688977	10.1	17.1	7.0		352422	18AB	2688859		18AB	10
352410	2688723	352455	2688783	7.9	17.8	9.9		352469	19AB	2688780		19AB	10
352410	2688723	352455	2688783	7.9	17.5	9.6		352469	19aAB	2688780		19aAB	10
352408	2688691	352458	2688700	7.3	16.7	9.4		352469	20AB	2688702		20AB	10
352394	2688647	352451	2688665	7.9	17.1	9.2		352465	21AB	2688654		21AB	10

Processing Data

- Synchronizing the Lot and Damage Element Data
  - Representative Northing And Representative Easting Were Calculated In Order To Find The Center Point For Each Damage Element
    - Representative Northing = (Ocean_N+Land_N) / 2
    - Representative Easting = (Ocean_E+Land_E) / 2
  - The Center Point was then compared to the Lot boundary information to determine which Lot the Damage Element corresponded to.

Some Data Not Present

- The Damage Elements contained the value of the structures on the Lot, but did not contain the value of the contents for the structures.
  - For contents value, we estimated the value to be 30% of the Structure Value

Issues/Concerns

- Identification of Lot, Damage Element, and Storm import formats
- Magnitude of data to be housed in system

Lot, Damage Element, and Storm Data

- Need to come up with standardized templates
  - Will allow user to import data as opposed to manually entering into system
    - Storms
    - Lots
    - Damage Elements

Magnitude of Data

- Current Storm Response Database Is ###Mb
  - Performance Drops After 400 – 500 Mb